take the proper steps to keep it in good condition while it is borrowed. As we all know, it takes a lot of time to collect, mount and label insect material. It costs a great deal to store such material. The greatest respect should be extended to persons who are willing to spend their time in such pursuits and then loan it to others to reap the benefits from studying such material.

The McClay Collection contains 5,250 determined species, 96,000 determined and 233,000 undetermined specimens, making a total of 329,000 in all. Dr. McClay offers 700 species for exchange. The names of those species are available from Dr. McClay upon request.

R. H. A.

A METHOD OF CLEANING INSECTS FOR STUDY

By HARRY G. NELSON

Hull Zoological Laboratory, University of Chicago, and Chicago City Junior College, Herzl Branch

In attempting to prepare large series of species of Elmidae for a study of morphological variation, difficulty was encountered in cleaning the specimens. Most individuals of this group, and of other families in the DRYOPOIDEA, have an encrustation over much or all of the integument when collected. This coating varies, depending upon the materials in solution in the waters in which these insects live. The thickness and extent of the deposition varies in different genera; causes of this variation are incompletely understood. Even the thinnest layer, however, may be sufficient to mask the characters which are of significance in taxonomic work.

Because no adequate method of cleaning has been available, most of the specimens in collections, including type material, are badly encrusted. As a result, the identification of species has been consistently poor, particularly if comparison with types has not been possible. There is no question but that the unsatisfactory state of taxonomic knowledge which has prevailed until recently in these groups has in large measure been due to the failure of workers to clean their specimens adequately. This may have been due to unsatisfactory working conditions, lack of recognition of the problem, or too high a regard for the integrity of the specimen as it comes from the field. In any case the result has been a muddled taxonomy and poorly organized collections. Keys based upon specific descriptions which utilize only the few characters discernible through the mud or pitch-like accumulations generally have been unsatisfactory. Attempts to use these keys to identify speci-

mens which are in no condition to be studied have resulted in identifications and records that are of little or no value.

Reference to the literature and suggestions by various individuals did not directly advance the solution to this problem. The author's first attempts involved the use of minuten nadeln, curved at the tip to prevent scratching. These tests, performed in 70% alcohol, were moderately successful in that some of the coating was scraped off, but the method was time consuming and not infrequently resulted in damaging the specimens. Moreover, the pitch-like layer sometimes encountered is impervious to this attack.

It was thought that a brush might prove to be more effective. Satisfactory results were ultimately obtained by using a small inexpensive paint brush, the metal tip of which is at most one and one-half millimeters in diameter. Either round or flat-tipped brushes can be turned into useful working tools. At normal length, the bristles are much too flexible and even when cut to a length of a millimeter often do not give a firm enough working surface. However, by beveling the metal tip which holds the bristles with a three-cornered file or hone under the microscope, the shortened fibers are crowded together. This results in an adequate tool with the added advantage that the beveled tip materially improves visibility while working.

Having a good brush, however, is usually not sufficient. The encrustation must be loosened before it will yield easily to the necessarily light brushing. Acetone, ether, and Barber's Relaxing Fluid (Valentine, J. M., Jour. Elisha Mitchell Scientific Soc., 50, 1934, pp.255-262.), were found to be of no value. It had been reported (Van Cleave, H. J. and J. A. Ross, Science, 105, 1947, p.318.), that tri-sodium-phosphate (known commercially as "T.S.P."), was quite effective in softening long dried materials once preserved in fluid fixatives. "T.S.P." is one of the most inexpensive and effective detergents for household and industrial use. These facts suggested that it might prove valuable in this particular problem. In weak solution, however, the results were but little better than without the treatment.

It must be confessed at this point that the resolution of the difficulties sprang from a fortunate coincidence of events. While experimenting with T.S.P. in the laboratory, the author was using a new collecting fluid in the field. Hinton (Trans. Roy. Ent. Soc. London, 90, 1940, pp.375-409.), recommends Pampel's Fluid (see

Imms, A. D., Nature, 144, 1939, pp.599-600.), as a preservative for insects where a study of internal anatomy is to be made. It was discovered that specimens which had been collected in Pampel's Fluid cleaned amazingly well after being subjected to a 20-30 minute bath in a solution of T.S.P.

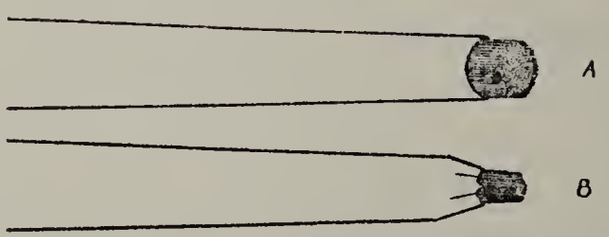
The concentration of tri-sodium-phosphate used need not be precise. A small pinch in a Syracuse dish with enough warm tap water added so as to cover the specimens yields good results. T.S.P. is not soluble in alcohol. Specimens may be left in the solution for a few days without bacterial action or undue softening of body tissues taking place. Other detergents have been tried but most are not as effective.

Slight modifications of the procedure are necessary if the insects have been collected dry or in alcohol, or have been mounted in an uncleaned condition. Good results can be obtained if the specimens are given a bath for 20-30 minutes in a 5-10% solution of glacial acetic acid *prior* to treatment with T.S.P. This finding suggests that acetic acid, one of the ingredients of Pampel's Fluid, loosens binding agents in the deposit, thus allowing tri-sodium-phosphate to dissociate the remainder. The time required in either of the solutions may vary somewhat depending upon the kind or amount of the sediment. Dry specimens should be relaxed in Barber's Fluid before handling.

After soaking, the actual cleaning process involves a certain amount of manual dexterity, especially in the case of the smaller insects. While the specimen is held with a pair of fine forceps in the T.S.P. solution, it is brushed under the microscope. The encrustation floats easily away and when clean the insect may be rinsed in 70% alcohol and is ready for mounting. The tri-sodium-phosphate solution has not been observed to harm forceps although Pampel's Fluid or acetic acid will cause rusting.

This method of cleaning specimens has proven useful for other Coleoptera such as certain Histeridae and specimens of the weevil genus *Microcryptorhynchus*. The latter insects are as badly encrusted as any the author has seen and in spite of their small size clean readily. The technique works well for Hemiptera such as aradids which are often covered with dirt, and also for many types of insect larvae whether aquatic or terrestrial. It seems likely that any insect which is heavily enough sclerotized to withstand the brushing can be cleaned satisfactorily.

Pampel's Fluid	*parts*	*Barber's Relaxing Fluid*	*parts*
distilled water	30	distilled water	245
95% ethyl alcohol	15	95% ethyl alcohol	265
glacial acetic acid	4	ethyl acetate	95
formaldehyde (40%)	6	benzol (benzene)	35
	55		640



A. View of brush tip with the fibers cut to a length of about 0.75 mm.
B. Brush tip after beveling. The metal bristle holder is crimped inward, thus crowding the bristles together.

Bibliographia

STUDIES ON THE DATES OF WORKS ON COLEOPTERA, III

By RICHARD E. BLACKWELDER

Stephens, J. F. 1829. The nomenclature of British Insects . . ., 68 pp. London. (June 1, 1829).

Stephens, J. F. 1829. A systematic catalogue of British Insects . . ., 416 and 388 pp. London. (July 15, 1829).

Dillwyn, L. W. 1829. Memoranda relating to coleopterous insects, found in the neighborhood of Swansea, 75 pp. Swansea. (Probably November 1829).

Fairmaire, L. & Laboulbene, A. 1854-1856. Faune entomologique francaise . . ., Coleopteres, vol. 1 (all published). Paris.

Pp. 1-180 July 1854
181-370 February 1855
371-665 June 1856

Olivier, A. G. 1789-1828. Encyclopedic Methodique. Paris. (Includes articles by Olivier, Latreille, Godart, Guerin-Meneville, Serville, LePeletier de Saint-Fargeau, etc.). Insects.